

## Earth's Hydrosphere

### ES-5 The student will demonstrate an understanding of Earth's freshwater and ocean systems.

#### ES-5.5 Explain the results of the interaction of the shore with waves and currents.

**Taxonomy level:** 2.7-B Understand Conceptual Knowledge

**Previous/future knowledge:** Students were introduced to features along the shore zone in 5<sup>th</sup> grade, as well as studying the affect that waves, currents, tides, and storms have on the geologic features of the ocean shore zone. They compared the movement of water by waves, currents, and tides. In Earth Science the students will explain these actions with greater understanding of the characteristics and motions of waves and currents causing changes along the shore.

**It is essential for students to know** the characteristic motion of *water waves*, including the factors that affect the height of a wave. They should know the cause of breaking waves and their affects on the shoreline. *Surface ocean currents* usually only affect the temperature of the shore area waters. *Longshore currents* transport sediment. Since most beaches consist of loose sediments, longshore currents can spread them out in the direction of the current flow along the shore. Large waves are associated with fast moving longshore currents and lots of sediment transport.

Students should have an understanding of *longshore current transport*.

- As a result of wave erosion, longshore current transport, and sediment deposition, the shoreline is in a constant state of change.
- Sediments eroded in one area are moved and deposited in another building various coastal landforms, such as sandbars, spits and barrier islands. Students should know how these features form and change due to wave action and current transport.

**It is not essential for students to know** about the cause and effects of tides on the shore zone. They do not need to study density ocean currents, turbidity currents, or upwellings with this indicator.

#### **Assessment Guidelines:**

The objective of this indicator is to *explain* the results of interactions of the shore with waves and currents; therefore, the primary focus of assessment should be to construct cause and effect models of how waves and currents cause changes along the shoreline.

In addition to *explain* appropriate assessments may require students to:

- *compare* the effects of strong wave action with gentler wave action;
- *summarize* the action of longshore current transport; or
- *identify* shoreline features caused by wave action or longshore transport.